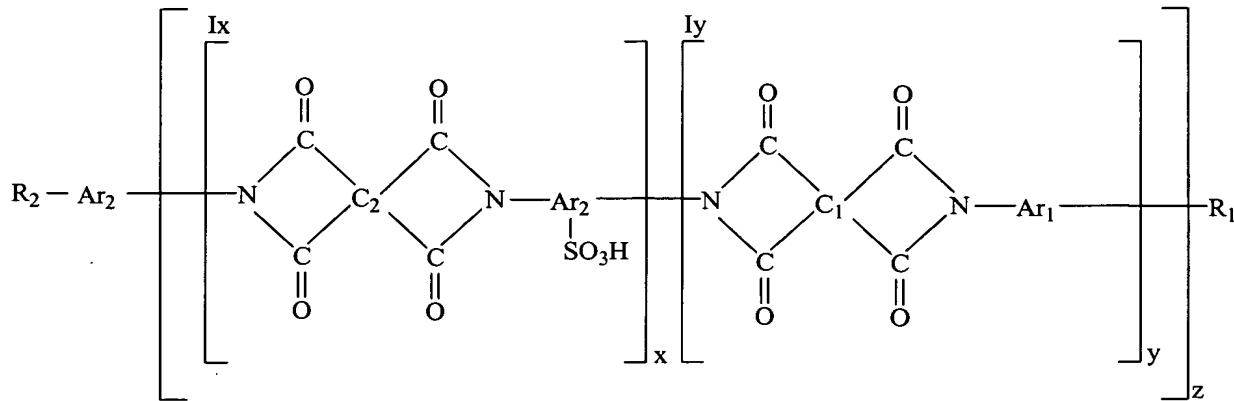


REMARKS/ARGUMENTS

The presently claimed invention involves block polymers of sulfonated polyimides of formula (I):



Applicants have discovered that block sulfonated polyimides of formula (I) have an excellent lifespan when used as an ion-exchange membrane in applications such as fuel cells. Applicants have found that block sulfonated polyimides are more stable when the sequence or block containing the sulfonic groups in polyimides of formula (I) is extended such that x is a real number from 5 to 10 and y is greater than or equal to x. This increase in stability leads to improved ion-exchange membranes for products such as fuel cells.

The rejection of Claims 1-18 and 20-28 over Claims 1-3 of U.S. Patent No. 6,425,944 ('944) is respectfully traversed.

'944 describes a sulfonated polyimide polymer that has random x and y values where some x and y values can be less than 5 in the repeating units of a polymer with the general structure of formula (I). While formula (I) is generic to both '944 and the presently claimed invention, '944 does not teach or suggest the specific block structure of the presently claimed invention for the repeating units x and y (i.e., x is a real number from 5 to 10 and y is a real number greater than or equal to x).

The examples given in '944 describe a process that can give values of x and y in formula (I) such that x and y can be random and can be less than 5. This can be seen by examining the synthetic process described in examples 1-5 of '944. In '944 all the reactants are added to the reactor in a one step process to form the sulfonated polyimide polymer. This one step synthesis leads to a polymer species with random x and y values for a polymer with the generic structure of formula (I). These random values can be values such that x and y are integers of less than 5.

The synthetic technique described in '944 is in contrast to the presently claimed invention that describes one possible method for producing a block sulfonated polyimide. The exemplary method described in '944 is a two-step process with a first step preparation of blocks of x and y and a second polymerization step into a block polymer species of a sulfonated polyimide of formula (I). This synthetic approach is illustrated in Example 1 of the present application. Here the two-step synthesis is conducted to build the x and y repeating units to 5 or greater before polymerization into the sulfonated polyimide of formula (I). This approach gives a block structure to the polymer as opposed to the random structure of the polymer described by the process in '944. Applicants note that the exemplary method given for producing the claimed blocked sulfonated polyimide does not limit the presently claimed invention to the described method for producing the claimed product.

The two-step approach described in the present application for forming this blocked species of sulfonated polyimide with the generic structure of formula (I) is not taught or suggested by reference '944, nor is any other method for producing a block sulfonated polyimide as claimed in e.g., Claim 1.

In addition, Applicants have discovered that the polymer species of the presently claimed block sulfonated polyimide polymer have superior properties as compared to the random polymers prepared in '944. When the x and y values of the polymer are as claimed,

the polymer has better aging properties and better resistance to hydrolysis. This leads to improved performance as an ion-exchange membrane relative to random polymers with x and y values less than 5. This is illustrated in Table II and in the discussion on pages 53 to 55.

The data indicates the presently claimed polymers have a lower hydrolysis rate upon aging as evidenced by higher swelling and reduced mass loss upon aging. In addition, the aged mechanical properties of the presently claimed polymers are improved over polymers with x and y values less than 5 (see Example 1.3).

Overall, the presently claimed block sulfonated polyimide is polymer neither taught or suggested by the cited reference and the presently claimed block sulfonated polyimide polymer gives superior performance over the described reference polymer. Therefore, the presently claimed invention is not obvious over '944, and accordingly, applicants respectfully request that the Examiner withdraw the rejection.

For the reasons discussed above for reference '944, applicants respectfully request that the Examiner withdraw the rejection of the claims over U.S. 6,245,881 and 6,376,129.

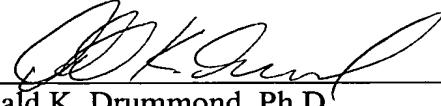
The objection to the Abstract has been obviated by appropriate amendment. As the Examiner will note, the Abstract is now one paragraph with less than 150 words. Accordingly, Applicants respectfully request that the objection be withdrawn.

The rejections of Claims 8, 17, 20, 21 and 28 over 35 U.S.C. § 112, second paragraph have been obviated by appropriate amendments. As the Examiner will note, the claims have been amended such that they are free of the criticisms outlined on pages 2 and 3 of the Office Action. Therefore, Applicants respectfully request that the Examiner withdraw the rejection.

In light of the remarks contained herein, Applicants respectfully submit that the present application is now in condition for allowance. Favorable reconsideration is respectfully requested.

Respectfully submitted,

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